



## PROPOSAL

Plan for Removal of Lead Bullets  
and Artillery Rounds from Lake  
Michigan Lakebed at North  
Chicago, IL

14 January, 2008

Prepared by:

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**1. INTRODUCTION:** This proposal for Removal of Lead Bullets and Artillery from the Lake Michigan lakebed adjacent to the FBI Firearms Training Facility in North Chicago, Illinois has been prepared at the request of:

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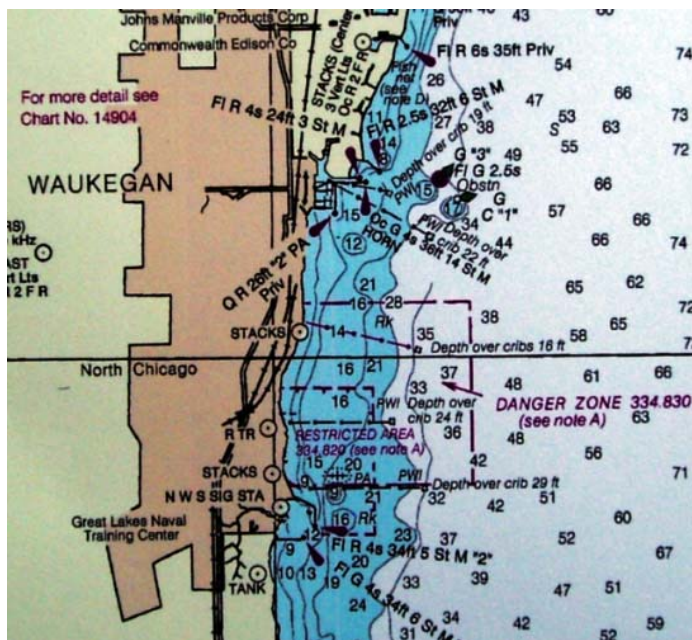
**2. PURPOSE AND GOALS:** This plan is for the removal of lead bullets and artillery rounds from the floor of Lake Michigan using innovative remote controlled range remediation technology developed by our company.

**3. SITE LOCATION:** The area identified for this removal action is 2,975 acres of lakebed adjacent to the FBI Firearms Training Facility in North Chicago, Illinois as outlined by the “danger zone”, and described in;

United States Coast Pilot 6 Great Lakes and their connecting waterways 2007

**§334.830 Lake Michigan; small-arms range adjacent to United States naval training Center, Great Lakes, Ill.**

(2364)(a) *The danger zone.* An area bounded on the north by latitude 42°20'30"; on the east by longitude 87°47'30"; on the south by latitude 42°18'45"; and on the west by the shore line.



According to documents obtained from the FBI, the 2,975 acres represents the FBI's assessment of the area “in Lake Michigan that provides the impact area for the firing range”. Mapping of bullet spread and stratification through the Wide Area Preliminary Assessment will illuminate the target areas for this removal action.

## 4. BACKGROUND

Ranges with offsite discharges requiring underwater remediation of mixed media such as lead bullets and artillery, like the Lake Michigan FBI impact area off North Chicago, are typically abandoned because large-scale artillery removal using divers is considered too dangerous. The Sea Harvester™ is an underwater roving vehicle with robotic arms

and other attachments allowing for remotely controlled removal outside the underwater blast radius for artillery. The underwater blast radius of artillery, including the 3" shells reportedly used at the North Chicago facility, is 600' whereas the Sea Harvester is remotely operated by experienced EOD technicians safely outside this area.

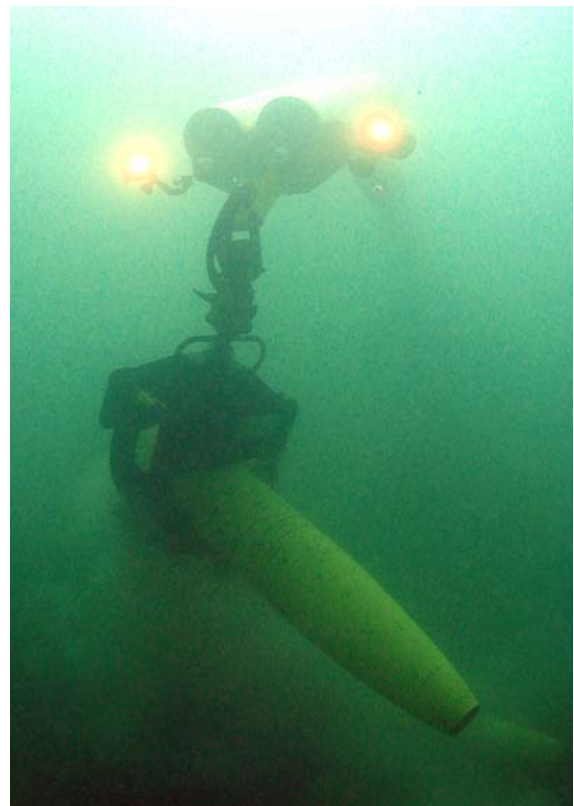
Any artillery encountered are picked up by robotic arm and placed in underwater bins that can be floated to the surface while still maintaining the artillery safely underwater. The bins are then presented to the Department of Defense for decommissioning using any of several zero discharge technologies.

The lead bullets are recovered using one of several Sea Harvester attachments for sifting or vacuuming the bottom depending on the local lakebed profile.

## 5. METHODOLOGY

**OUTLINE OF SYSTEM FUNCTIONS** - The Sea Harvester™ is a remote operated, self propelled, geo-referenced, hazardous waste recovery system developed by UOR. It was designed specifically for the non-destructive recovery and safe handling of industrial and defense wastes. These include, but are not limited to, fully armed unexploded ordnance found in a marine environment (UWUXO), lead bullets, and structurally corrupted 55 gallon drums. This is primarily accomplished through the use of mechanical arms manipulating a clamshell, grapple, or vacuum attachment of various size and configuration.

**Chassis** – The self-propelled mobility chassis provides the platform on which modular mission packages are mounted, either individually or in tandem as needed.



The chassis may be wheeled or tracked, depending upon the bottom profile. It is driven by an electrically powered, closed circuit, bio-degradable hydraulic system. Electrical power, as well as command and control, is provided by the floating command station through an armored umbilical cable.

The umbilical is of sufficient length to account for depth and scope requirements, while still allowing the command crew to operate the Sea Harvester from outside the safe exclusion zone for blast and fragmentation, (where applicable). The umbilical is deployed from a hydraulically powered winch drum containing an internal slip ring. The slip ring provides uninterrupted power and command signals as the winch drum rotates.

**Command Station** - The floating command station may be a barge or motor vessel, provided it offers sufficient stability for any anticipated sea state, dynamic positioning, and enough deck space to launch and recover the Sea Harvester, as well as enough deck space to conduct maintenance on the Harvester, mount the umbilical winch, the command pod, generators, spare parts, tools, fuel and hydraulic fluid storage, enclosed work space for electronic, hydraulic and administrative purposes, and quarters for the crew (where round the clock operations are desired).

The command pod is a modular, climate controlled enclosure for two systems operators and one observer, and houses all electronic and hydraulic controls and visual displays.

**Collection: Artillery** - When recovering low densities of high explosive projectiles spread over larger areas (several square miles), a mechanical arm fitted with a grapple attachment is used to collect and place munitions into a detachable collection bin. Once filled, the collection bin is off loaded, its location recorded for later pick up, and an empty bin takes its place.

Target acquisition when using a grapple equipped mechanical arm in good visibility (8 ft or better), is accomplished using lights and cameras incorporating image enhancing software. For low visibility target acquisition, tandem mounted sub bottom profiling sonar is used.

Collection bins are designed as vessels for in-water storage of munitions prior to disposal operations, and are used to transport munitions to and from temporary storage, sorting, or staging areas. Collection bins can be transported to a disposal facility by loading them back on to the mobility chassis and driving to the destination, by attaching a float collar and tow line, or by attaching a lifting harness for hoisting directly on to the deck of a sea based disposal platform.

**Collection: Bullets** - Lead bullets resting on clay or rock bottom, and those mixed with sand and gravel sediments, are vacuumed into a two stage partially enclosed belt driven conveyance. The first stage is "open", and sort's larger items; the second stage is "semi-closed", and uses a combination of water agitation and screens to accomplish the gross separation of lead from sediments. The lead particulate matter is diverted into the collection bin before the sedimentary material is re-deposited on the lake bed in a continuous row behind the Harvester.

Collection bins modified for the process of sorting lead bullets from sand or gravel have detachable compartmentalized mini bins for collecting the occasional high explosive projectile, which may be encountered at certain sites. This "one pass" clearance methodology prevents the need to re-acquire such targets at a later date (which could prove to be difficult due to munitions migration), and results in a more consistent program of quality assurance.

Compartmentalized mini-bins loaded with UWUXO are either dropped off on the grid when full for later recovery, or floated to the surface and towed to an in-water storage or

disposal site. These are replaced with empty bins as needed with minimal impact on the process of separating lead bullets from bottom sediments.

**Quality Assurance** - Quality assurance is multidimensional, using magnetic anomaly mapping of surface and buried munitions, through a ferrous metal detector array and dedicated software, augmented by time stamped and geo-referenced digital video recordings.

Quality assurance is further enhanced through the use of a GPS positioning system which permits the clearance of individually numbered squares from a designated grid.

## 6. PROJECT COST AND PAYMENT MILESTONES

This removal action has a total cost of \$27,000,000.

### Payment Schedule

1. Due upon initiation of contract	\$9,000,000
2. Due upon commencement of removal	\$9,000,000
3. Due upon 50% removal by area	\$5,000,000
4. Due upon 100% removal area harvested	\$4,000,000

Payment 1 is due upon signing the contract.

Payment 2 is due upon assembly and "ready for deployment" of Lake Michigan specific Sea Harvester™ for remote, self-propelled, geo-referenced, hazardous waste recovery, incorporating the following features:

- Chassis and Command Module
  - A wheeled mobility chassis
  - Eight digital cameras with image enhancing software, lights, and recording gear
  - Magnetic anomaly detection array and mapping software
  - GPS positioning system
  - 1200 FT armored umbilical cable, mounted on a hydraulically powered, slip ring equipped winch drum, and a standalone diesel powered hydraulic pump
  - Three person climate controlled command pod
  - Two large capacity diesel powered generators
- Collection Apparatus
  - Grapple equipped mechanical arm with a minimum 1500 LB lifting capacity
  - Two maneuverable bullet and sediment vacuums
  - Two belt-driven, two-stage sediment conveyance and materials sorting modules
- Storage Compartments
  - Two collection bins modified for the process of sorting lead bullets from sand or gravel
  - Four detachable collection bins, four float collars, tow lines and assorted rigging



- Eight detachable compartmentalized mini bins, eight float collars, tow lines and assorted rigging
- Project related non-capital equipment
  - Full time marine support equipment – A single barge or composite platform of suitable displacement and stability (given the anticipated sea state), to support up to 50 tons of system components, ancillary equipment, work shops, and living quarters, plus a minimum of 4000 square feet of open deck, work/storage space. This platform will have a four point mooring system which incorporates a dynamic positioning capability.
  - Additional full time marine support equipment includes one perimeter security vessel equipped with suitable lights and markings; one utility boat equipped with a GPS and a sampson post for towing; and one personnel water taxi.
  - Part time marine support equipment – a barge or vessel with a derrick, crane, or boom, with a minimum 100 ton lift capacity required to launch and recover the Sea Harvester.

Payment 3 is due upon 50% clearance by area.\*

Payment 4 is due upon completion of 100% clearance by area.\*

\*The Sea Harvester will be used to clear 2,975 acres of lake bed (identified as the “Danger Zone”, in United States Coast Pilot 6 “Great Lakes and their connecting waterways 2007” **§334.830 Lake Michigan; small-arms range adjacent to United States naval training Center, Great Lakes, Ill.**), of no less than 85% of the high explosive projectiles which can be identified on the surface of, or suspended in, sediments to a depth of eight inches. Transport these munitions to areas designated as temporary underwater storage sites or staging areas (no more than five miles from the point of collection), in preparation for disposal. Clear no less than 75% of the lead bullets which can be identified on the surface of, or suspended in, sediments to a depth of six inches. Transport this lead to a surface storage site (no more than five miles from the point of collection), in preparation for disposal.

## 7. CONTRACT LIMITATIONS

The following are not included as part of this proposal:

- Disposal-The lead bullets and artillery collected will be handed off to the Government for proper disposal – If requested, UOR Inc. is capable of zero emissions disposal and will furnish a separate proposal
- Remediation of greater than the 2,975 acres identified by the FBI as the impact area – Should the wide area preliminary assessment indicate an area greater than 2,975 acres needs remediation, a separate proposal for cleanup of additional lakebed will be furnished.

- Other hazardous waste besides artillery and lead bullets – If, during assessment or removal, other hazardous waste is identified that cannot be removed except by using new Harvester attachments not included in this proposal, a separate proposal for those attachments and removal operations will be furnished.
- Capital Equipment – The site specific Harvester and other equipment assembled for this project will remain the property of UOR upon project completion.

## 8. QUALIFICATIONS

Underwater Ordnance Recovery Inc. (UOR) operates on the leading edge of non-destructive removal of military munitions and defense wastes from underwater through the use of robotics. President James Barton is a commercially certified professional diver, qualified in surface supplied air/mixed gas, and bell/saturation diving. A former US Navy Diver and Explosive Ordnance Disposal Technician, he provided advanced EOD underwater munitions response training to US Navy Fleet EOD assets worldwide, is a qualified Master Training Specialist, Curriculum Developer, and Small Arms Master Instructor, and achieved the rank of petty officer first class.

UOR began in 1999 upon the retirement of Mr. Barton, from US Naval Explosive Ordnance Disposal Mobile Unit Two, Norfolk, VA. Mr. Barton began his career in 1975 by joining EOD Mobile Unit One in Hawaii, where he first encountered large numbers of Underwater Unexploded Ordnance (UWUXO).

Through innovative technology, UOR makes large scale UWUXO remediation operations a practical and cost effective alternative to abandonment.

- Graduate of US Naval School - Explosive Ordnance Disposal, Indian Head, MD.(Oct. 1989)
- Developer of remotely operated Ordnance Recovery System (ORS)
- Developer of the Sea Harvester™, a mobile munitions recovery system adaptable to Lake Michigan underwater environment
- Expert on domestic and internationally recognized “zero emissions” ordnance disposal systems
- Steering Committee Member, *First International Conference on Sea Dumped Munitions*, Halifax, Nova Scotia (Oct., 2007)
- Session Chair, *Shipwrecks in the Baltic Sea*, US/Baltic International Symposium, Klaipeda, Lithuania (May, 2006)
- Developer of underwater demining protocol for Bosnia/Herzegovina (Nov., 2005)
- Project Manager, *Radiological, Chemical, and Environmental Health Assessment of the Marine Resources of the Isla de Vieques Bombing Range*, Bahia Salina del Sur, Puerto Rico (Mar., 2004)
- Subject Matter Expert on Abandoned Underwater Ordnance, Address to the Presidential Panel Investigating the Vieques Island Bombing Range (Aug., 1999)